REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

I. Disposition of Claims

Claim 33 is requested to be cancelled. Claims 32, 34-36, 46, 50 and 72 are currently being amended. New claims 134-136 are being added. No new matter is being added with the amendments. Claim 32 is revised to include salient recitations of claim 33, and claims 34 and 36 are amended to reflect dependency from claim 32, not claim 33. Support for claim 35 can be found in the specification, for example in paragraph [0050]. Support for claim 46 can be found in the specification, for example in paragraphs [0051]-[0052] and [0056]. Claim 50 is amended to correct a typographical error. Amended claim 72 includes language from original claim 33. Support for new claim 134 can be found in the specification, for example in paragraph [0061]. Support for new claim 135 can be found paragraph [0042]. Support for new claim 136 can be found in the specification, for example in paragraphs [0045] and [0070]. Upon entry of this response, claims 32, 34-37, 41, 43-44, 46-50, 72-75, 81, 88, 120, 129 and 134-136 will be pending.

II. Claims 32, 43, 48 And 72-74 Are Not Anticipated

Claims 32, 33, 43, 48, and 72-74 are rejected for alleged anticipation over Ebbesen *et al.*, US 5,973,316 ("Ebbesen"). Office Action, pp. 2-4. The present cancellation of claim 33 moots this aspect of the rejection. Against the rest of the claims, Applicants respectfully traverse the rejection.

To anticipate a claim, a reference applied against it must teach every element of the claim. MPEP 2131. Applicants respectfully submit that Ebbesen does not teach every limitation of claims 32, 43, 48 and 72-74.

A. Ebbesen Does Not Teach the Different Spacing of Claims 32 and 72

Claims 32 and 74 recite "the metal film or metal islands comprise at least two cells; a first period of first openings in the first cell is different than a second period of second openings in a second cell; a transmission of the radiation having the second peak wavelength through the first openings in the first cell is enhanced due to the first period; and a transmission of the radiation having the third peak wavelength through the second openings in the second cell is enhanced due to the second period" (emphasis highlighted). This feature is illustrated in Figures 1 and 2A, which show cells 108A, 108B and 108C with different distances (different periods) relative to openings 107, allowing wavelengths λ_i, λ_j and λ_k to pass through each cell 108A, 108B, and 108C, respectively. Similarly, Figure 2C depicts different distances between cells 208A, 208B, and 208C. Accordingly, each cell, having a unique distance between openings 107, passes a peak wavelength that is different from that of the other cells. Such a function allows for simultaneous passing of different wavelengths along different sections of the device.

In stark contrast, Ebbesen does not describe a device having *a first period of first openings in the first cell is different than a second period of second openings in a second cell*, or a method providing simultaneous wavelength separation based on the different periods, as claimed. Page 3 of the Office Action cites column 4, lines 42-47 as allegedly describing this feature. The cited section states that, in referring to Figure 1, "individual hole diameter, d, was varied between 150 nm and 1 μm and the spacing between holes in the rectangular array, P, was between 0.6 and 1.8 μm." This description, however, merely indicates that a device, as a whole, can include a hole spacing selected from a range of distances. This description does not state, nor imply, that different cells within the same device have different aperture spacing. At best, Ebbesen teaches that different devices can be produced, each device having a different uniform distance between holes. To illustrate this point, most examples in Ebbesen refer to a substrate with a single, uniform spacing between apertures. For example, column 4, lines 53-56 describe "a rectangular array of 150 nm apertures with a periodicity of 0.9 μm"; column 5, lines 23-24 describe "space between apertures of 0.6 μm"; and column 6, line 66 to column 7, line 1 describing "parallel slots...spaced 0.6 μm apart."

Moreover, even where Ebbesen describes specific separation of cells, each cell having a set of apertures, the distance between the apertures is the same in all cells. As described in

column 7, lines 33-35, "apertures have a...spacing of 1 μm and the groups are separated by a distance D of 5 μm." See also, Figure 11A. This example describes groups or cells of apertures separated by a distance "D," where apertures in each group or cell are separated by the same spacing, "1 μm," such that the device comprises repetitions of the same group or cell having the same aperture spacing. In contrast, each cell of claim 32 comprises different spacing between apertures. Because Ebbesen does not describe this aspect, it does not teach all limitations of the claimed invention. Accordingly, Ebbesen does not anticipate claims 32 and 72, nor their dependent claims.

Applicants, therefore, respectfully request that the rejection be withdrawn.

B. Ebbesen Does Not Teach the Metal Islands of Claim 74

Claim 74 recites "a plurality of metal islands on the substrate." This feature is exemplified by Figures 2B and 9, which show raised elements, identified by reference 5, as the "islands." The islands are further described as capable of being "discrete metal islands that are not connected to each other...or metal islands that are connected to each other at a peripheral region of the optical device," and as recited in claim 88. Specification, page 29, [0103]. Applicants respectfully submit that Ebbesen does not describe these features.

In contrast, Ebbesen describes a metal film that comprises holes or slits that cannot be considered discrete "islands." As exemplified by Figures 1, 5-6, 8, and 10-11, the film comprises holes or slits "punched" through the film such that there is an array of holes or slits in the surface of the film. In fact, Ebbesen does not describe any device with discrete elements that fall within the scope of an "island." Indeed, the only discrete elements are the holes or slits themselves, which is the opposite arrangement from the claimed invention. Accordingly, Ebbesen's devices are wholly distinct from the claimed device comprising *a plurality of metal islands on the substrate*, as claimed. Ebbesen, therefore, fails to teach each and every claimed element of claim 74 and its dependents.

Moreover, islands provide better transmission than films. The metal film of Ebbesen would have a transmittance of less than 10%. The metal islands claimed, however, would have a transmittance of greater than 70%. For example, Figures 18 and 20C demonstrate

peak transmittance over 45% and over 35% for unpolarized light, respectively. For TM polarized light, the unpolarized transmittance values are multiplied by two. Thus, for TM polarized light, the transmittance would be over 90% and 70%, respectively. See also paragraphs [0177] and [0193].

Applicants respectfully request that the rejection be withdrawn.

III. Claims 34-38, 41, 44, 49-50, 75, 81 and 120 Are Not Obvious

Claims 34-35, 37, 41, 44, 49-50, 75, 81 and 120 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Ebbesen. Claims 36 and 88 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Ebbesen in view of Blasing (US 5,455,594) ("Blasing"). Claims 36 and 88 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Ebbesen in view of Thio et al (US 2003/0173501) ("Thio"). Office Action, pp. Applicants respectfully traverse the rejections.

In the aforementioned remarks, Ebbesen was shown not to teach all recited elements of independent claims 32, 72 and 74, respectively. In particular, Ebbesen does not describe *a first period of first openings in the first cell is different than a second period of second openings in a second cell* and fails to describe that *transmitted radiation is simultaneously separated into a plurality of passbands having different peak wavelengths.*

Blasing and Thio do not remedy these deficiencies of Ebbesen. For instance, Blasing does not describe a device having different periods of openings between different cells. Blasing also does not teach describe simultaneously passing different peak wavelengths. Moreover, Blasing is directed to devices that reject short wavelengths but pass through millimeter wavelengths (see col. 5, ll. 13-21). Such a device is incompatible with the device of Ebbesen, which passes wavelengths in the micrometer and nanometer range.

In the same vein, Thio does not describe a device having different periods of openings between different cells, nor does it describe a method of simultaneously passing different peak wavelengths. Indeed, the only section where Thio describes aperture arrays describes the apertures as having one periodicity, P_2, throughout the entire surface (pp. 2-3, paragraph [0024] and Fig. 1). Thio therefore does not make up for the deficiencies of Ebbesen.

Applicants submit, therefore, that no permutation of teachings from Ebbesen, Thio, and Blasing could render the present claims obvious, within the meaning of Section 103. Accordingly, Applicants respectfully request withdrawal of the rejection.

IV. New Claims 134-136

Claims 134-136 recite preferred size ranges for the metal islands. It is believed that the wavelength of peak transmission (i.e., the center wavelength of main passband or so-called resonance wavelength) is governed by the total periphery of each metal island. The total periphery is determined by the geometry and dimensions of the island cross-section, such as the period of openings, the metal film thickness, and the gap size (opening) between neighboring islands. While the period of openings is the main parameter that determines the peak wavelength, the thickness of metal film and the width of opening can also be adjusted in order to optimize the passband characteristics (peak wavelength, passband width, and transmittance).

This is described in the specification paragraphs number 164-168, which describe the effect of surface plasmon resonance localized on each metal island and the relationship between the island periphery and the peak transmission wavelength. Furthermore, paragraph numbers 140, 141, 159, and 175 describe the effect the metal thickness effect on the passband characteristic and paragraph number 173 describes the advantage of selecting the optimum opening width between metal islands in achieving ideal bandpass filter characteristic, i.e., in suppressing long wavelength transmission.

In claim 134, the metal island thickness range is selected to be at least one times surface plasmon penetration depth (skin depth), which is typically 10-30 nm for Ag in optical frequency range. In claim 135, the opening width range is selected to suppress the longer wavelength transmission (long pass) and keeping only the main passband in order to achieve an ideal bandpass characteristic. Thus, this opening width range for single passband filter characteristic is selected to be one to three times the penetration depth, i.e., 10-100 nm. Claim 136 recites a preferred period of the openings.

CONCLUSION

Applicants submit that the present application is in condition for allowance, and they request an early indication to this effect. Examiner Legasse is invited to contact the undersigned directly, should he feel that any issue warrants further consideration.

The Commissioner is hereby authorized to charge any additional fees, which may be required under 37 CFR §§ 1.16-1.17, and to credit any overpayment to Deposit Account No. 19-0741. Should no proper payment accompany this response, then the Commissioner is authorized to charge the unpaid amount to the same deposit account. If any extension is needed for timely acceptance of submitted papers, then Applicants hereby petition for such extension under 37 CFR §1.136 and authorize payment of the relevant fee(s) from the deposit account.

Respectfully submitted,

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